

Research On Biomass Fast Pyrolysis For Liquid Fuel

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Renewable energy is growing it's importance in meeting with the society development and environment requirement concerning about the fossil fuel's shortage and the global Greenhouse Effect . With a great deal of resource in China, and also its' zero emission of CO₂, biomass is the most potential energy to develop.

The fast pyrolysis of biomass is one of the most important techniques in biomass utilization field, which converts low quality biomass waste into higher quality liquid fuel, used for combustion or upgrading into diesel oil and gasoline, and also used to produce special and commodity chemistry material.

On the basic of a comprehensive assessment and comparison of the existing biomass pyrolysis technologies, a fluidized bed reactor system is developed to produce bio-oil. The reactor has some novel design specially suiting biomass characteristics .It can meet with the fast heating requirement and control the temperature stably, changing the carrier gas flow rate the volatile's resident time in the bed can be controlled about 1~2 seconds.

In our experiments the biomass feedstock mainly is rice straw, soft wood sawdust and hard wood sawdust, which can represent the major biomass resource in China. A systematic research and analysis on characteristics of biomass pyrolysis are made in the reactor system. Various operation condition(reaction temperature, particle size, gas resident time ,operation pressure, heating ration etc) change the yield and quality of bio-oil ,the maximum yield of 58% of dry biomass fed is obtained at 450? .

The physical and chemical properties of the bio-oil are analyzed, they show a disciplinarian with the react condition changing. Comparison of the bio-oil produced from different feedstock, the hardwood gives the most high bio-oil yield and high caloric value. But all of them have a high oxygen content and high water content which are undesired characteristics for combust or deep utilization, further upgrading should be researched to overcome these defects.

The chemical compositions of bio-oil are determined by means of GC-MS, before which a quantitative pretreatment is made, five fractions separated from the crude bio-oil. All the fractions and crude bio-oil are analyzed, the acid fraction holds the largest, and the alkali fraction holds the fewest, which includes some nitrogenous aromatic components such as C₉H₇N, and some ketone, aldehyde. The hydrocarbon fraction composed mainly of aromatic components with 2~4 rings, also some phenolic. From the analysis of the crude bio-oil ,we found all the bio-oil are quite similar each other ,just different compositions percentage. All have 2-furaldehyde, 2-methoxyl phenol, 2-methoxyl 4-methyl phenol etc. But not all the bio-oil are detected to contain levoglucosan which is thought to be the major production of cellulose, we think the component is too active to further reaction. The operation condition's effect on the bio-oil's quality are investigated, it also show a disciplinarian.